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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/615,645	07/08/2003	Quanxi Jia	S-97,819	1200

7590 10/02/2006  
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EXAMINER

HU, SHOUXIANG

ART UNIT PAPER NUMBER

2811

DATE MAILED: 10/02/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/615,645	JIA ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Shouxiang Hu	2811	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 11 July 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 6-13, 16 and 18-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5, 14, 15 and 17 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>7/13/06</u> .   | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Election/Restrictions***

1. Claims 6-7, 10, 12-13, 16 and 18-20 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on July 13, 2006.
2. In addition, claims 8-9 and 11 are also withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being unreadable on the elected species. Claim 8 recites the subject matter of a mixed metal oxide, which is unreadable on the elected species of a cadmium sulfide as the semiconductor film.
3. Accordingly, claims 1-20 are pending in this application; and claims 1-5, 14-15 and 17 remain active in this office action.

### ***Claim Objections***

4. Claims 1-5, 14-15 and 17, as being supported by the elected species, are objected to because of the following informalities and/or defects:

Claim 1 recites the terms of "polymer" and "metal" in line 3, but fails to clarify their relationships with the polymer and metal recited in line 2.

Claim 1 recites the subject matters of a selenium- or tellurium-containing gas, which are unreadable on the elected species.

Claim 5 recites the subject matter of "organic solvent free". However, the solution defined in claim 1 of the instant invention includes the recited soluble polymer; and such polymer-resolved solution should be able to function as an organic-contained solvent to certain types of chemicals. Thus, it appears to be inappropriate to define the recited solution of the instant invention as organic solvent free.

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-3, 14 and 17, as being supported by the elected species and as being best understood in view of the claim objections above, are rejected under 35 U.S.C. 103(a) as being unpatentable over Negami (Negami et al., US 5,728,231) in view of Anderson (Anderson et al., US 5,494,700).

Negami discloses a process of preparing a semiconductive film, comprising: forming a metal oxide film (e.g., a film containing Cu, see col. 11, line 65, through col. 12, line 31); and, reacting the metal oxide film with a sulfur-, selenium- or tellurium-containing gas under conditions sufficient to form a semiconductive film.

Negami does not expressly disclose that the metal oxide film can also be formed through a solution-based depositing method. However, one of ordinary skill in the art would readily recognize that such solution-based method is desirable for forming a solution-processed metal oxide film with reduced cost, compared with other methods that require expensive depositing tools, as evidenced in Anderson. Anderson teaches a solution-based depositing method (col. 2, line 54, through col.3, line 7) for forming a metal oxide film (such as: a Cu-contained oxide film, among a wide variety of metal oxide films, see col. 4, lines 12-34) that is substantially free of cracks and pinholes. The method include the steps of: applying a solution containing a soluble polymer and a soluble metal precursor onto a substrate to form a polymer and metal containing layer thereon; treating the substrate including the polymer and metal containing layer for a time to form a coherent composite film; heating the substrate in an oxygen-containing atmosphere at temperatures characterized as naturally sufficient to remove the polymer from the composite film and form a metal oxide film.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate Anderson's solution-based depositing method for the solution-processed metal oxide film into the method of Negami, so that a method would be obtained for forming a semiconductor film with reduced cost and/or with an intermediate metal oxide film that is substantially free of cracks and pinholes.

Regarding claim 2, the solution of Negami can be regarded as an aqueous solution, since the starting solution in Negami can be heated at a temperature as

Art Unit: 2811

low as only about 25 °C, which would naturally leave at least some water inside the coating solution; and the coating solution has a pH value that at least partially overlaps with the recited one of about 4 to about 7 (see col. 6, lines 7-40).

Regarding claim 14, the polymer of Negami can naturally include polyethylene glycol, since the starting solution in Negami can include ethylene glycol (col. 5, lines 13-19) and undergoes polymerization (at least partially), which would naturally result in at least some polyethylene glycol in the coating solution.

Regarding claim 17, the treating step of Anderson further includes a step of drying (col. 8, lines 23-55) that is naturally at temperatures characterized as insufficient to remove the polymer but sufficient to form the coherent composite film.

6. Claim 4, as being supported by the elected species and as being best understood in view of the claim objections above, is rejected under 35 U.S.C. 103(a) as being unpatentable over Negami in view of Anderson, as applied to claims 1-3, 14 and 17 above, and further in view of Switzer (US 4,492,811).

Although Negami and Anderson do not expressly disclose that the metal oxide film can be cadmium oxide and the semiconductive film can be CdS or CdSe, one of ordinary skill in the art would readily recognize that CdS and/or CdSe film(s) can be desirably formed for forming a CdS- and/or CdSe-based solar cell, as evidenced in Switzer (col. 3, lines 36-43). And, it is further noted that it is art-known that soluble Cd salts are readily available in the art.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use and/or develop the process collectively taught by Negami and Anderson above, with the intermediated metal oxide film being formed of cadmium oxide through introducing an art-known cadmium salt, so that a method for making a desired CdS- and/or CdSe-based solar cell would be obtained, per the teachings of Swizer.

7. Claims 5 and 15, as being supported by the elected species and as being best understood in view of the claim objections above, is rejected under 35 U.S.C. 103(a) as being unpatentable over Negami in view of Anderson, as applied to claims 1-3, 14 and 17 above, and further in view of Machin (Machin et al., US 3,353,635).

Although Negami and Anderson do not expressly disclose that the polymer can be a polyvinyl alcohol, one of ordinary skill in the art would readily recognize that polyvinyl alcohol is a commonly used water-soluble polymer for forming a substantially pure metal oxide, as evidenced in Machin (col. 8, lines 47-69).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use and/or develop the process collectively taught by Negami and Anderson above, with the soluble polymer in the starting solution being formed of polyvinyl alcohol, so that a method for making a desired semiconductive film with desired high purity in the intermediate metal oxide film therein would be obtained, per the teachings of Machin.

Art Unit: 2811

Regarding claim 4, with the soluble polymer in the starting solution being formed of polyvinyl alcohol, which is the same as that of the instant invention, the process collectively taught by Negami and Anderson in view of Machin would be substantially same as that of the instant invention.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shouxiang Hu whose telephone number is 571-272-1654. The examiner can normally be reached on Monday through Thursday, 7:30 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C. Lee can be reached on 571-272-1732. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service



Art Unit: 2811

Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

SH  
September 20, 2006

A handwritten signature in black ink, appearing to read 'Shu' or 'Shu' with a stylized flourish.

SHOUXIANG HU  
PRIMARY EXAMINER